2.) $f(t) = 2t+1$

$\langle f, B \rangle$ $\int_0^{1/4}(2t+1)\,dt = t^2+t\,\big|_0^{1/4} = 0.3125$

$= t^2+t\,\big|_{1/4}^{1/2} = 0.4375$

$= t^2+t\,\big|_{1/2}^{3/4} = 0.5625$

$= t^2+t\,\big|_{3/4}^{1} = 0.6875$

$\langle B, B \rangle$ $\int_0^1 (1)^2\,dt = t\,\big|_0^{1/4} = 1/4$

$t\,\big|_{1/4}^{1/2} = (1/2 - 1/4) = 1/4$

$t\,\big|_{1/2}^{3/4} = (3/4 - 1/2) = 1/4$

$t\,\big|_{3/4}^{1} = (1 - 3/4) = 1/4$

$c_1 = 1.25$, $c_2 = 1.75$, $c_3 = 2.25$, $c_4 = 2.75$

$g(t) = 1.25 \cdot B_1(t) + 1.75 \cdot B_2(t) + 2.25 \cdot B_3(t) + 2.75 \cdot B_4(t)$

10.) $f(t) = 2t+1$

$c_1 = \dfrac{\langle f, B \rangle}{\langle B, B \rangle} : \dfrac{\int_0^1 (2t+1)\,dt}{\int_0^1 (1)^2\,dt} = \dfrac{t^2+1\,\big|_0^1}{1} = 2$

$c_2 = \dfrac{\langle f, w \rangle}{\langle w, w \rangle} : \dfrac{\int_0^{1/2}(2t+1)\,dt + \int_{1/2}^{1}-(2t+1)\,dt}{\int_0^{1/2}(1)^2\,dt + \int_{1/2}^{1}(-1)^2\,dt} = \dfrac{t^2+t\,\big|_0^{1/2} - (t^2+t\,\big|_{1/2}^{1})}{t\,\big|_0^{1/2} + t\,\big|_{1/2}^{1}} = \dfrac{-1/2}{1} = -0.5$

$c_3 = \dfrac{\langle f, w_0' \rangle}{\langle w_0', w_0' \rangle} : \dfrac{\int_0^{1/4}(2t+1)\,dt + \int_{1/4}^{1/2}-(2t+1)\,dt}{\int_0^{1/4}(1)^2\,dt + \int_{1/4}^{1/2}(1)^2\,dt} = \dfrac{t^2+t\,\big|_0^{1/4} - (t^2+t\,\big|_{1/4}^{1/2})}{t\,\big|_0^{1/4} + t\,\big|_{1/4}^{1/2}} = \dfrac{-1/8}{1/2} = -0.25$

$c_4 = \dfrac{\langle f, w_1' \rangle}{\langle w_1', w_1' \rangle} : \dfrac{\int_{1/2}^{3/4}(2t+1)\,dt - \int_{3/4}^{1}(2t+1)\,dt}{\int_{1/2}^{3/4}(1)^2\,dt + \int_{3/4}^{1}(-1)^2\,dt} = \dfrac{t^2+t\,\big|_{1/2}^{3/4} - (t^2+t\,\big|_{3/4}^{1})}{t\,\big|_{1/2}^{3/4} + t\,\big|_{3/4}^{1}} = \dfrac{-1/8}{1/2} = -0.25$

$c_1 = 2$, $c_2 = -0.5$, $c_3 = -0.25$, $c_4 = -0.25$

$g(t) = 2 \cdot B(t) - 0.5 \cdot W(t) - 0.25 \cdot W_0'(t) - 0.25 \cdot W_1'(t)$